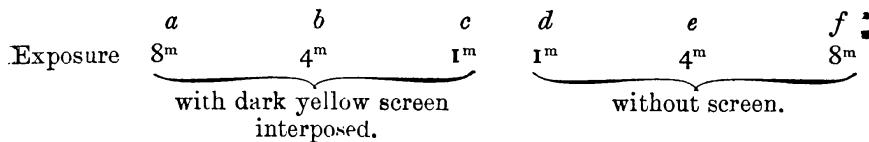


Fig. 8.—Three marks on an isochromatic plate kept at a fixed focus-reading: exposures with different apertures.

a. 24 inches aperture. *b.* 18 inches aperture. *c.* 12 inches aperture.

Fig. 9.—Marks made by Procyon on plate exposed at $1\frac{1}{2}$ inch within the visual focus.



On Two Distribution Maps of the Nebulae and Clusters in Dr. Dreyer's Catalogue of 1888. By Sidney Waters.

In 1873 I had the honour to lay before the Society in two maps a graphical representation of the distribution of the nebulae and clusters of the General Catalogue (Sir John Herschel's Catalogue of 1864). Since then the New General Catalogue (Dr. Dreyer's Catalogue) has been published; and whereas the earlier Catalogue contained the positions and descriptions of 5,079 objects, more than half as many again—*i.e.*, 7,840—are enumerated in the later one. The northern section of the Milky Way in my original maps was copied from Heis, and the southern section from Sir John Herschel's drawing; but there are now available the beautiful drawings of Dr. Boedicker, and also those of Dr. Gould in the *Uranometria Argentina*.

It appeared to me under these circumstances that fresh maps constructed under the improved conditions would be interesting, and in the charts which I now beg to present to the Society I have laid down upon the same projection as before all the objects contained in the New General Catalogue. I have added a copy of Dr. Boedicker's Milky Way, for which I am indebted to Mr. Wesley's excellent engraving for the northern heavens, and a copy of the Milky Way as it appears in the *Uranometria Argentina* for the southern heavens.*

The projection is that described by Sir John Herschel on p. 134 of the *Results of Astronomical Observations at the Cape of Good Hope*, and by its means equal areas in the heavens are represented by equal areas on the charts. The defect of this projection is the distortion occasioned as the Equator is approached, but for distribution maps it is practically the only projection that will satisfy the desirable condition of equal areas. The positions of all objects are laid down as accurately as possible, but the exceeding nearness of many of them to one another has made it impossible in such cases to place them in precisely their true positions,

* I have to thank Mr. Wesley for the great amount of trouble that he has taken to secure a satisfactory reproduction of the charts, and in particular for very skilfully lithographing the Milky Way upon the reduced scale.

and at the same time to render them as separate objects. In the case of the Magellanic clouds the crowding has resulted in these extraordinary aggregations being made to cover a larger area upon the chart than should be the case, and in the great nebulous region of Virgo and in other places where the crowding is exceedingly great small displacements of position occur in consequence. In looking at the drawings of the Milky Way in the two hemispheres, it will be remembered that the projection is altered, and that the originals have been produced by observers under different conditions of climate, power of vision, &c., and that Dr. Boeddicker's work was the result of years of patient observation, resulting in a record of an astonishing wealth of detail.

I have designed the charts with two objects. First, as a study of the distribution of the clusters and nebulae, and, secondly, as a possible guide to astronomers who are engaged upon observations of the nebulae photographically and otherwise.

With regard to the clusters, which are marked with a red cross, it is striking to note the fidelity with which they follow not only the main track of the Milky Way, but also its convolutions and streams. They appear in many parts to seek out the denser regions and to avoid with an equal persistence the dark spaces. It appears to me that if further confirmation were required in favour of the view that the clusters are immersed in and a part of the galaxy itself, these maps supply it, for it is impossible for such a scheme of distribution to have arisen through chance scattering.

I have divided the nebulae into two classes, separating those described in the Catalogue as resolvable from the rest. The resolvable nebulae are marked as red dots, and the irresolvable nebulae as black dots. This was done in the original maps, and I have therefore kept up the distinction, although I am aware that this difference is inclined to disappear under recent research. A proportionate scattering of resolvable nebulae follow the others throughout the charts, showing that they are probably intermixed, and that the resolvability of many of them must not necessarily be regarded as a criterion of their distance. The remarkable avoidance of the nebulae of the galaxy, although in some points reaching up to and encroaching upon its edges, is equally significant with the coincidence of the clusters with its main track, and in this respect there is nothing to alter the conclusions which have been previously drawn from this circumstance. The additional nebulae in the new maps are by no means uniformly distributed. Among the alterations which attract attention in the northern heavens is a considerable accession of numbers in the regions of *Draco* and *Corona Borealis* and *Serpens*, and there is an addition in the remarkable extension of the nebular system which runs up from *Pegasus* through *Andromeda* to *Perseus* upon the border of the Milky Way. There is also an increase in the neighbourhoods of *Cancer* and *Lynx*, while

in the southern hemisphere the increase of numbers is not so great as in the northern, nor is it very noticeable in any particular quarter; and I commend this fact to the attention of the southern observatories, in the hope that more attention may be given to the search for these objects.

There are two points that have occurred to me continually while engaged upon the maps: the exceeding nearness to one another of very many of the nebulae suggests the probability of physical connection in many instances analogous to that of double stars, and I recommend it as a hopeful field of research whether orbital motions can be detected by the spectroscope or by photography. I have also again and again noticed configurations which remind one of groups of stars having a common proper motion; and the second suggestion I would make is the likelihood of a good result from an examination for proper motion.

With regard to the second object that I had in view in constructing the maps, I have little to say except that I hope they may serve to indicate, though roughly no doubt, the parts of the heavens likely to repay research, inasmuch as a graphical representation must necessarily have some advantage over a catalogue for this purpose.

Note on B.A.C. 5,255 = Brisbane 5,525. By A. M. W. Downing,
M.A., D.Sc.

My attention has been called to No. 5,255 of the British Association Catalogue of Stars, by Dr. E. Lamp, who informs me that, on looking for the occultation predicted in the *Nautical Almanac* for March 25 last, he was unable to find any star in the assigned place, and that on several subsequent occasions he was equally unsuccessful. The place given in the B.A.C. depends on one observation made at Paramatta, and Dr. Lamp suggests that this observation may really have been one of the neighbouring star 3 *Scorpii*, with an error of 10' in the recorded declination, as well as an error in the R.A. The reference to Taylor V., 2,873, given in the B.A.C., is misleading, as Taylor merely gives the approximate position taken from Brisbane's Catalogue, and, as a reference to his MSS. shows, on reducing his attempt to observe this supposed star, found that he had really observed 2 *Scorpii*. A note to the recorded position of the latter star in the Cape Catalogue for 1880 says: "No seventh magnitude star was visible on 1878 June 12 nearer R.A. 15^h 47^m and N.P.D. 115° 3', which is the place of Brisbane 5,525." The Cordoba *Durchmusterung* gives no star in this place, although there is a 9.8 mag. star exactly 1^m later in R.A., and of the same declination. Lastly, Mr. Crommelin kindly informs me that he has looked for the supposed star on two separate occasions, but has been unable